# VOLUME 17 CONTENTS

## Number 1


| | | |
|---|---|---|
| | 1 | Editorial |
| B. AGNEW, A. ANDERSON and T. H. FROST | 3 | Optimisation of a steady-flow Carnot cycle with external irreversibilities for maximum specific output |
| J. BELLETTRE, V. SARTRE, F. BIAIS and A. LALLEMAND | 17 | Transient state study of electric motor heating and phase change solid–liquid cooling |
| S. B. RIFFAT, C. F. AFONSO, A. C. OLIVEIRA and D. A. REAY | 33 | Natural refrigerants for refrigeration and air-conditioning systems |
| F. MEUNIER, F. POYELLE and M. D. LEVAN | 43 | Second-law analysis of adsorptive refrigeration cycles: the role of thermal coupling entropy production |
| P. M. PELAGAGGE, A. C. CAPUTO and G. CARDARELLI | 57 | Optimization criteria of heat recovery from solid beds |
| K. T. OOI and T. N. WONG | 65 | A computer simulation of a rotary compressor for household refrigerators |
| I. W. EAMES and H. M. SABIR | 79 | Potential benefits of electrohydrodynamic enhancement of two-phase heat transfer in the design of refrigeration systems |
| XIAO FENG and T. BERNTSSON | 93 | Critical COP for an economically feasible industrial heat-pump application |
| LINGEN CHEN, CHIH WU and FENGRUI SUN | 103 | Heat transfer effect on the specific heating load of heat pumps |
| | 111 | Announcement |
| | I | Calendar |
| | III | PatentsALERT |


## Number 2


| | | |
|---|---|---|
| Y. S. H. NAJJAR | 113 | Comparison of performance for cogeneration systems using single- or twin-shaft gas turbine engines |
| C. S. KHALID AHMED, P. GANDHIDASAN and A. A. AL-FARAYEDHI | 125 | Simulation of a hybrid liquid desiccant based air-conditioning system |
| K. A. R. ISMAIL and R. F. MIRANDA | 135 | Two-dimensional axisymmetrical model for a rotating porous wicked heat pipe |
| G. P. XU and Y. Q. DAI | 157 | Theoretical analysis and optimization of a double-effect parallel-flow-type absorption chiller |

V. TUFANO — 171 Heat recovery in distillation by means of absorption heat pumps and heat transformers

C. TANTOLIN and M. LALLEMAND — 179 Film condensation inside horizontal integral-fin tubes of large diameter

K. A. ANTONOPOULOS, C. TZIVANIDIS and M. VRACHOPOULOS — 193 Using orthogonal expansion of functions over multilayer walls for calculating the layer thermal properties

CHIH WU, LINGEN CHEN and FENGRUI SUN — 203 Optimization of solar absorption refrigerator

209 Announcement

I Calendar

III PatentsALERT

## Number 3

D.-W. SUN — 211 Thermodynamic design data and optimum design maps for absorption refrigeration systems

R. AYALA, C. L. HEARD and F. A. HOLLAND — 223 Ammonia/lithium nitrate absorption/compression refrigeration cycle. Part I. Simulation

F. A. YOUSSEF — 235 On the heat transfer from an expanding cylinder in cross-flow

X. FENG and X. X. ZHU — 249 Combining pinch and exergy analysis for process modifications

K. C. NG, H. T. CHUA, W. ONG, S. S. LEE and J. M. GORDON — 263 Diagnostics and optimization of reciprocating chillers: theory and experiment

LINGEN CHEN, FENGRUI SUN and CHIH WU — 277 Influence of heat transfer law on the performance of a Carnot engine

J. J. BONILLA, J. M. BLANCO, L. LÓPEZ and J. M. SALA — 283 Technological recovery potential of waste heat in the industry of the Basque Country

M. PONS and Y. FENG — 289 Characteristic parameters of adsorptive refrigeration cycles with thermal regeneration

C. D. RAKOPOULOS and E. G. GIAKOUMIS — 299 Speed and load effects on the availability balances and irreversibilities production in a multi-cylinder turbocharged diesel engine

315 Announcements

I Calendar

III PatentsALERT

## Number 4


| | | |
|---|---|---|
| W. RIVERA, R. BEST, J. N. BAKER, W. H. FLETCHER, C. L. HEARD and F. A. HOLLAND | 317 | Mobile pilot-plant for the production of environmentally clean steam |
| Y. TENG, R. Z. WANG and J. Y. WU | 327 | Study of the fundamentals of adsorption systems |
| W. QIN and C. Y. LIU | 339 | Liquid flow in the anisotropic wick structure of a flat plate heat pipe under block-heating condition |
| K. A. ANTONOPOULOS, M. VRACHOPOULOS and C. TZIVANIDIS | 351 | Experimental and theoretical studies of space cooling using ceiling-embedded piping |
| R. M. LAZZARIN and A. GASPARELLA | 369 | New ideas for energy utilisation in combined heat and power with cooling: I. Principles |
| P. K. NAG and S. DE | 385 | Design and operation of a heat recovery steam generator with minimum irreversibility |
| L. SHAO and S. B. RIFFAT | 393 | Flow loss caused by heat pipes in natural ventilation stacks |
| LINGEN CHEN, FENGRUI SUN, CHIH WU and R. L. KIANG | 401 | A generalized model of a real refrigerator and its performance |
| | I | Calendar |
| | III | PatentsALERT |


## Number 5


| | | |
|---|---|---|
| K. C. NG, H. T. CHUA and Q. HAN | 413 | On the modeling of absorption chillers with external and internal irreversibilities |
| A. ONG'IRO, V. I. UGURSAL, A. M. AL TAWEEL and J. D. WALKER | 427 | Modeling of heat recovery steam generator performance |
| L. SCHIBUOLA | 447 | High-efficiency recovery for air-conditioning applications in a mild climate: a case study |
| H. Z. ABOU-ZIYAN, M. F. AHMED, M. N. METWALLY and H. M. ABD EL-HAMEED | 455 | Solar-assisted R22 and R134a heat pump systems for low-temperature applications |
| M. MOSTAFAVI and B. AGNEW | 471 | Thermodynamic analysis of combined diesel engine and absorption refrigeration unit—naturally aspirated diesel engine |
| R. M. LAZZARIN and A. GASPARELLA | 479 | New ideas for energy utilisation in combined heat and power with cooling: II. Applications |

I Calendar

III PatentsALERT

## Number 6

P. NEVEU and J. CASTAING-LASVIGNOTTES — 501 Development of a numerical sizing tool for a solid–gas thermochemical transformer—I. Impact of the microscopic process on the dynamic behaviour of a solid–gas reactor

J. CASTAING-LASVIGNOTTES and P. NEVEU — 519 Development of a numerical sizing tool applied to a solid–gas thermochemical transformer—II. Influence of external couplings on the dynamic behaviour of a solid–gas thermochemical transformer

F. N. ALASFOUR — 537 Butanol—a single-cylinder engine study: availability analysis

K. J. KIM, K. T. FELDMAN JR, G. LLOYD and A. RAZANI — 551 Compressor-driven metal-hydride heat pumps

XIAO PING WU, P. JOHNSON and A. AKBARZADEH — 561 Application of heat pipe heat exchangers to humidity control in air-conditioning systems

N. MILOSAVLJEVIC, P. MALINEN, P. HEIKKILÄ, I. JOKIOINEN and K. EDELMANN — 569 Experimental and theoretical investigations for the design of scrubbers in heat recovery from paper machines

ZHEN-XIANG GONG and A. S. MUJUMDAR — 583 Finite-element analysis of cyclic heat transfer in a shell-and-tube latent heat energy storage exchanger

M. MOSTAFAVI and B. AGNEW — 593 Thermodynamic analysis of combined diesel engine and absorption refrigeration unit—naturally aspirated engine with precooling

601 Erratum

I Calendar

III PatentsALERT

## Number 7

K. DARKWA and P. W. O'CALLAGHAN — 603 Green transport technology (GTT): analytical studies of a thermochemical store for minimising energy consumption and air pollution from automobile engines

M. PONS — 615 Analysis of the adsorption cycles with thermal regeneration based on the entropic mean temperatures

| | | |
|---|---|---|
| LINGEN CHEN, FENGRUI SUN, CHIH WU and JIANZHENG GONG | 629 | Maximum power of a combined-cycle isothermal chemical engine |
| LINGEN CHEN, CHIH WU and FENGRUI SUN | 639 | Steady flow combined refrigeration cycle performance with heat leak |
| CHI-CHUAN WANG | 647 | A numerical method for thermally non-equilibrium condensing flow in a double-pipe condenser |
| R. BUDIN and A. MIHELIĆ-BOGDANIĆ | 661 | Heat recovery in polyester production: a case study |
| LANCHAO LIN and A. FAGHRI | 667 | Steady-state performance in a thermo-syphon with tube separator |
| | 681 | Announcements |
| | I | Calendar |
| | III | PatentsALERT |


## Numbers 8–10

### Special Issue: Energy Efficiency in Industry


| | | |
|---|---|---|
| P. A. PILAVACHI | 683 | Editorial |
| *Heat Exchangers* | | |
| M. GROLL and R. MERTZ | 685 | Improved evaporation heat transfer surfaces for cost-effective compact heat exchangers for the process industries |
| P. A. KEW and K. CORNWELL | 705 | Correlations for the prediction of boiling heat transfer in small-diameter channels |
| J. M. GRILLOT | 717 | Compact heat exchangers liquid-side fouling |
| A. J. KARABELAS, S. G. YIANTSIOS, B. THONON and J. M. GRILLOT | 727 | Liquid-side fouling of heat exchangers. An integrated R&D approach for conventional and novel designs |
| G. BERGELES, D. BOURIS, M. YIANNESKIS, S. BALABANI, A. KRAVARITIS and S. ITSKOS | 739 | Effects of fouling on the efficiency of heat exchangers in lignite utility boilers |
| J. D. ISDALE, P. MERCIER, J. M. GRILLOT, A. MULHOLLAND and J. GOMATAM | 751 | Integrated modelling of process heat transfer with combustion and fouling |
| J. D. ISDALE, A. M. JENKINS, V. SEMIÃO, M. G. CARVALHO and M. C. WELBOURNE | 763 | Fouling of combustion chambers and high-temperature filters |
| P. BANDELIER | 777 | Improvement of multifunctional heat exchangers applied in industrial processes |

C. LUZZATTO, A. MORGANA, S. CHAUDOURNE, T. O'DOHERTY and G. SORBIE — 789 — A new concept composite heat exchanger to be applied in high-temperature industrial processes

J. C. DERONZIER and G. BERTOLINI — 799 — Plate heat exchangers in liquid-crystal polymers

C. H. PHILLIPS, G. LAUSCHKE and H. PEERHOSSAINI — 809 — Intensification of batch chemical processes by using integrated chemical reactor–heat exchangers

A. MULDER, O. BROST and P. NEUMANN — 825 — Catalytic combustion in a sintered metal reactor with integrated heat exchanger

*Chemical Reactors*

N. V. DEWACHTERE, G. F. FROMENT, I. VASALOS, N. MARKATOS and N. SKANDALIS — 837 — Advanced modeling of riser-type catalytic cracking reactors

L. FALK and J. VILLERMAUX — 845 — Numerical scale-up and design of high-efficiency mixers for control and optimisation of the yield and selectivity in chemical reactors

R. J. JACHUCK, J. LEE, D. KOLOKOTSA, C. RAMSHAW, P. VALACHIS and S. YANNIOTIS — 861 — Process intensification for energy saving

*Separation Processes*

P. D. MARTIN and S. W. SWANTON — 869 — Improved efficiency of adsorption processes

D. VERDOES, G. J. ARKENBOUT, O. S. L. BRUINSMA, P. G. KOUTSOUKOS and J. ULRICH — 879 — Improved procedures for separating crystals from the melt

R. GANI, G. HYTOFT and C. JAKSLAND — 889 — Design and analysis of supercritical extraction processes

C. BERMOND — 901 — Establishing the scientific base for energy efficiency in emerging pressing and drying technologies

A. VAN DER DRIFT, N. B. K. RASMUSSEN and K. JØRGENSEN — 911 — Improved efficiency drying using selective emittance radiant burners

*Furnaces, Kilns and Ovens*

M. G. CARVALHO and M. NOGUEIRA — 921 — Improvement of energy efficiency in glass-melting furnaces, cement kilns and baking ovens

A. KONTOPOULOS, K. KRALLIS, E. KOUKOURAKIS, N. DENAXAS, N. KOSTIS, A. BROUSSAUD and O. GUYOT — 935 — A hybrid, knowledge-based system as a process control 'tool' for improved energy efficiency in alumina calcining furnaces

*Electricity Saving*

H. GROSSMANN and L. SALMÉN 947 Exploration of new scientific ideas for significant electricity savings in mechanical upgrading of pulp fibres for papermaking

*Refrigeration*

N. J. HEWITT and J. T. MCMULLAN 955 The replacement of CFCs in refrigeration equipment by environmentally benign alternatives

*Systems Engineering*

C. JAKSLAND, G. HYTOFT and R. GANI 973 Computer-aided process design and optimization with novel separation units

F. MARÉCHAL and B. KALITVENTZEFF 981 Effect modelling and optimization, a new methodology for combined energy and environment synthesis of industrial processes

J. KLEMEŠ, V. R. DHOLE, K. RAISSI, S. J. PERRY and L. PUIGJANER 993 Targeting and design methodology for reduction of fuel, power and $CO_2$ on total sites

G. HEYEN and B. KALITVENTZEFF 1005 Methodology for optimization of operation to reduce site-scale energy use in production plants

L. PUIGJANER 1015 Process integration with combined heat and power (CHP)

H. C. VAN DEVENTER 1035 Feasibility of energy efficient steam drying of paper and textile including process integration

1043 Announcement

I Calendar

III PatentsALERT

## Number 11

P. M. PELAGAGGE, A. C. CAPUTO and G. CARDARELLI 1045 Comparing heat recovery schemes in solid bed cooling

Y.-P. CHANG, R. TSAI and J.-W. HWANG 1055 Condensing heat transfer characteristics of aluminum flat tube

Z.-X. GONG and A. S. MUJUMDAR 1067 Thermodynamic optimization of the thermal process in energy storage using multiple phase change materials

T. KIATSIRIROAT and T. EUAKIT 1085 Performance analyses of an automobile air-conditioning system with R22/R124/R152A refrigerant

Z. ZHOU 1099 Thermal analysis of slow discharge from a pressurized natural gas storage tank

R. BEST, W. RIVERA, M. J. CARDOSO, R. J. ROMERO and F. A. HOLLAND 1111 Modelling of single-stage and advanced absorption heat transformers operating with the water/Carrol mixture

1123 Announcement

1125 Erratum

I Calendar

## Number 12

LI ZHI ZHANG and LING WANG 1127 Performance estimation of an adsorption cooling system for automobile waste heat recovery

M. KADJA and G. BERGELES 1141 Computational study of turbine blade cooling by slot-injection of a gas

N. E. WIJEYSUNDERA 1151 Performance of three-heat-reservoir absorption cycles with external and internal irreversibilities

M. R. CONDE 1163 Energy conservation with tumbler drying in laundries

N. M. AL-NAJEM and M. M. EL-REFAEE 1173 A numerical study for the prediction of turbulent mixing factor in thermal storage tanks

S. GARIMELLA, D. LACY and R. E. STOUT 1183 Space-conditioning using triple-effect absorption heat pumps

1199 Announcement

I Calendar

III PatentsALERT